

**C.) REMARKS**

This Response is filed in response to the Office Action dated May 22, 2006.

Upon entry of this Response, claims 1-9, 11-25 and 27-34 will be pending in the Application.

In the outstanding Office Action, the Examiner rejected claims 1-5, 11, 19-23, 27-29 and 30 under 35 U.S.C. 103(a) as being unpatentable over Inaba et al. (U.S. Patent No. 4,877,388) in view of Japanese Publication No. 60-102878 (Sugiyama); rejected claims 6 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Inaba et al. (U.S. Patent No. 4,877,388) in view of Japanese Publication No. 60-102878 (Sugiyama) and further in view of Tokizaki et al. (U.S. Patent No. 5,528,114); rejected claims 7, 8 and 25 under 35 U.S.C. § 103(a) as being unpatentable over Inaba et al. (U.S. Patent No. 4,877,388) in view of Japanese Publication No. 60-102878 (Sugiyama) and further in view of Kobayashi et al. (G.B. Publication No. 2 264 204); rejected claim 9 under 35 U.S.C. § 103(a) as being unpatentable over Inaba et al. (U.S. Patent No. 4,877,388) in view of Japanese Publication No. 60-102878 (Sugiyama) and Kobayashi et al. (G.B. Publication No. 2 264 204) and further in view of Sood (U.S. Patent No. 5,235,504); rejected claims 13-18 under 35 U.S.C. § 103(a) as being unpatentable over Inaba et al. (U.S. Patent No. 4,877,388) in view of Beaverson et al. (U.S. Patent No. 5,894,736) and Japanese Publication No. 60-102878 (Sugiyama); rejected claims 31 and 32 under 35 U.S.C. § 103(a) as being unpatentable over Inaba et al. (U.S. Patent No. 4,877,388) in view of Japanese Publication No. 60-102878 (Sugiyama) and further in view of Rose (U.S. Patent No. 2,442,021); rejected claims 33-34 under 35 U.S.C. § 103(a) as being unpatentable over Inaba et al. (U.S. Patent No. 4,877,388) in view of Japanese Publication No. 60-102878 (Sugiyama) and further in view of Kumar (U.S. Patent No. 5,896,021); and indicated claims 12 and 18 would be allowable if rewritten in independent form.

### **Rejection under 35 U.S.C. 103**

#### **A. Rejection of claims 1-5, 11, 19-23, 27-29 and 30**

The Examiner rejected claims 1-5, 11, 19-23, 27-29 and 30 under 35 U.S.C. 103(a) as being unpatentable over Inaba et al. (U.S. Patent No. 4,877,388), hereinafter referred to as "Inaba," in view of Japanese Publication No. 60-102878, hereinafter referred to as "Sugiyama."

Specifically, the Examiner stated that

Regarding Claims 1 and 19, Inaba discloses a converter stage (Figure 3 item 1G) to convert an AC voltage to a DC voltage, the converter stage being configured to be electrically connectable to an AC power source (Figure 3 item E), a DC link stage (Figure 3 item C) to filter and store energy from the converter stage, the DC link stage being electrically connected to the converter stage; an inverter stage (Figure 3 items 11 and 11') comprising a plurality of inverters electrically connected in parallel to the DC link stage, each inverter of the plurality of inverters being configured to convert a DC voltage to an AC voltage to power a corresponding load, and the control circuit (Figure 3 item 12) controls each inverter of the plurality of inverters being configured to operate substantially independently of other inverters of the plurality of inverters. Refer to column 3 lines 1-68 and column 4 lines 1-34. However, Inaba does not disclose wire bonds sized or similar to disconnect the inverter from the DC link stage in the event a fault occurs in one of the inverter and the corresponding motor.

Sugiyama discloses a parallel redundancy synchronous operation type inverter that if a malfunction occurs in any of three inverters when the inverters are operated in parallel, the selecting breakage switch (2) of the defective inverter is opened to disconnect the defective inverter. This is similar to the limitation of wire bonds sized (switches) to disconnect the inverter from the DC link stage in the event a fault occurs in one of the inverter and the corresponding motor.

It would have been obvious to one of ordinary skill in the art at the time of invention to use Inaba's invention with Sugiyama's a parallel redundancy synchronous operation type inverter. The advantage of combining the two would improve the reliability of an inverter by disconnecting only the inverter when a defect occurs in any of the inverters and switching to a standby inverter.

Applicants respectfully traverse the rejection of claims 1-5, 11, 19-23, 27-29 and 30 under 35 U.S.C. 103(a).

Inaba, as understood, is directed to a mold clamping apparatus for use in an injection molding machine having a plurality of servomotors for drivingly rotating a ball screw as a spindle. The servomotors are driven in synchronism so as to produce the same torque by means of driving circuits, which respond to the same torque command generated in accordance with a

signal representative of a rotational position of one of the servomotors. A control unit is provided, which has a control circuit responsive to a position/speed signal associated with one of the motors, and two motor driving circuits for the motors. The control unit is arranged to deliver the same drive current command from its control circuit to both of the motor drive circuits.

Sugiyama, as understood, is directed to parallel redundancy operation with a single operating load. This parallel redundancy requires redundant circuitry and it requires a means to change the state of a selective breakage switch. Further, Sugiyama has parallel redundant synchronous inverters, so that in the case of a malfunction in one inverter, the selective breakage switch is opened and one of the remaining inverters drives the load. If a malfunction occurs in any of three inverters when the inverters are operated in parallel, the selecting breakage switch of the defective inverter is immediately opened to disconnect the defective inverter. When inverter #2 or #3 is disconnected, inverter #1 is continued in synchronous operation with a preliminary power source. When inverter #1 is disconnected, the synchronous command switch SW1 of inverter #2 is rapidly switched to the preliminary power source side, and inverter #2 is synchronously operated with the preliminary power source. Inverter #3 is followed to the synchronization of inverter of #2.

In contrast, independent claim 1, as amended, recites a variable speed drive comprising: a converter stage to convert an AC voltage to a DC voltage, the converter stage being configured to be electrically connectable to an AC power source; a DC link stage to filter and store energy from the converter stage, the DC link stage being electrically connected to the converter stage; and an inverter stage comprising a plurality of inverters electrically connected in parallel to the DC link stage, each inverter of the plurality of inverters being configured to convert a DC voltage to an AC voltage to power a corresponding load, each inverter of the plurality of inverters being configured and disposed to receive an individual control signal from a control panel that is separate and independent from control signals provided to other inverters of the plurality of inverters, and each inverter of the plurality of inverters being controlled and operated substantially independently of other inverters of the plurality of inverters by the individual control signals received from the control panel; and wherein each inverter of the plurality of

inverters comprises wire bonds sized to disconnect the inverter from the DC link stage in the event a fault occurs in one of the inverter or the corresponding load powered by the inverter.

Independent claim 19, as amended, recites a variable speed drive for a chiller system having a plurality of compressors, the variable speed drive comprising: a converter section to convert an AC voltage to a DC voltage, the converter section being configured to be electrically connectable to an AC power source; a DC link section to filter and store energy from the converter section, the DC link section having a DC bus being electrically connected to the converter section; and an inverter section comprising a plurality of inverters electrically connected in parallel to the DC link section, each inverter of the plurality of inverters being configured to convert a DC voltage to an AC voltage to power a corresponding compressor motor, each inverter of the plurality of inverters being configured and disposed to receive an individual control signal from a control panel that is separate and independent from control signals provided to other inverters of the plurality of inverters, and each inverter of the plurality of inverters being controlled and operated substantially independently of other inverters of the plurality of inverters by the individual control signals received from the control panel; and wherein each inverter of the plurality of inverters comprises wire bonds sized to disconnect the inverter from the DC link stage in the event a fault occurs in one of the inverter and the corresponding compressor motor.

To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974). “All words in a claim must be considered in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970). If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

See Manual of Patent Examining Procedure, 8<sup>th</sup> Edition, Revision 4 (MPEP), Section 2143.03.

Several of the features recited by Applicant in independent claims 1 and 19 are not taught or suggested by Inaba and Sugiyama. Inaba and Sugiyama do not teach or suggest that each inverter of the plurality of inverters receives an individual control signal from a control panel that is separate and independent from control signals provided to other inverters of the plurality

of inverters or that each inverter of the plurality of inverters is controlled and operated substantially independently of other inverters of the plurality of inverters by the individual control signals received from the control panel, as recited by Applicant in independent claims 1 and 19. In Inaba, the driving circuits are controlled such that both motors always operate at the same time, at the same speed, and deliver the same torque. *See e.g.*, Inaba col. 2, line 57-68; col. 3, lines 22-47; and col. 3, line 62 to col. 4, line 3. Specifically, the motors “are driven in synchronism with each other so as to produce the same torque.” *See* Inaba col. 3, lines 47-49. The requirement of synchronous operation of the motors in Inaba, which requires joint or common control of the driving circuits in Inaba, precludes Inaba from providing any teaching or suggestion that the driving circuits in Inaba can be controlled and operated substantially independently as recited by Applicant in independent claims 1 and 19.

Furthermore, the control unit in Inaba is “arranged to deliver the same drive current command from its control circuit to both of the motor drive circuits.” *See* Inaba col. 2, lines 66-68. Specifically, Inaba states at column 3, line 52 to column 4, line 1 that

[i]n operation, when the speed command value  $V_o$  from the host control unit such as an NC, is applied to the transistor PWM control circuit 12, the circuit 12 compares the speed command value  $V_o$  with the present speed  $S$  detected by the position detector P. **In accordance with the difference between the value  $V_o$  and the speed  $S$ , the control circuit 12 delivers the PWM signals PA to PF, and causes the transistor inverters 11 and 11' to drive the servomotors M1 and M2,** so as to control the motor speeds to a command speed. At this time, the transistors associated with the corresponding phases of the transistor inverters 11, 11', serving to control the currents flowing through the windings of the individual phases of the servomotors M1 and M2, are turned on or off in accordance with the same PWM signal, so that one and the same current flows synchronously through the windings of each phase of the servomotors M1 and M2. [Emphasis added.]

This teaching of the use of the same PWM signal in Inaba is further expanded on in Figure 3, which shows only one (1) corresponding output line (PA-PF) from the PWM control circuit that is provided to corresponding transistors of each of the driving circuits. The use of the same control signal in each of the driving circuits in Inaba and the fact that one of the driving circuits is controlled based on readings from the motor controlled by the other driving circuit, again preclude Inaba from providing any teaching or suggestion that the driving circuits in Inaba

receive individual control signals that are separate and independent or that each inverter of the plurality of inverters can be controlled and operated substantially independently of other inverters as recited by Applicant in independent claims 1 and 19. In addition, in the present invention each of the inverters receives its own control signals from the control system to provide substantially independent operation of each inverter. *See* Applicant's Application, Figure 4B. Similarly, Sugiyama does not teach or suggest any of the features discussed above and appears to only have been applied to show the use of a switching arrangement with an inverter. Thus, since Inaba and Sugiyama do not teach or suggest all of the limitations recited in independent claims 1 and 19, Applicant respectfully submits that Inaba and/or Sugiyama do not anticipate nor render obvious Applicant's invention as recited in independent claims 1 and 19.

In the Response to Arguments section in the outstanding Office Action discussing controls signals, the Examiner states

Examiner basis rejection on the claims as presented where plurality of inverters receiving a separate and independent control signal. In Inaba, the control circuit (Figure 3 item 12) controls each inverter of the plurality of inverters being configured to operate substantially independently of other inverters of the plurality of inverters; the control signal sent from the control circuit provide one control signal however, that control signal is separate for independent control of the inverters. Further, in claims 4 and 22 describes a common set of control instructions to each inverter. Refer to column 3 lines 1-68 and column 4 lines 1-34. In re Stevens, 212 F.2d 197, 101 USPQ 284 (CCPA 1964) (Claims were directed to a handle for a fishing rod wherein the handle has a longitudinally adjustable finger hook, and the hand grip of the handle connects with the body portion by means of a universal joint. The court held that adjustability, where needed, is not a patentable advance, and because there was an art-recognized need for adjustment in a fishing rod, the substitution of a universal joint for the single pivot of the prior art would have been obvious.). In this case, the signals sent to each inverter can be different based on an adjustment by the inventor or operator, which would not be a new and different discovery. Further, it would appear that based on the drawings and description the controller is sending a signal to each inverter.

While Applicant disagrees with the Examiner's interpretation of Inaba with respect to the claims 1 and 19 as discussed in detail above, Applicant has amended claims 1 and 19 to clarify that each inverter receives an individual control signal that is separate and independent from control signals provided to the other inverters. It is submitted that this amendment to claims 1 and 19 clearly distinguishes claims 1 and 19 from Inaba and Sugiyama. It is noted for the

Examiner that the inverter 11' in Inaba does not receive an individual control signal from the control circuit, as the control signal for the inverter 11' is split from the control signal for the inverter 11. In addition, since the control signal for the inverter 11' in Inaba is split from the control signal for the inverter 11, the control signal for the inverter 11' clearly cannot be separate and independent from the control signal for the inverter 11. In addition, while each inverter receives an individual control signal that is separate and independent from control signals provided to other inverters in Applicant's invention, it is noted that the control instructions sent to the inverters using the control signals do not have to be different from one another and can be common to all inverters.

Next, the Applicant does not understand the Examiner's reference to adjustability and requests that the Examiner provide additional information so Applicant can respond appropriately. Is the Examiner referring to the adjustability of the control signals or to the adjustability of the control instructions in the control signal?

In addition, Inaba and Sugiyama do not teach or suggest that each inverter of the plurality of inverters comprises wire bonds sized to disconnect the inverter from the DC link stage in the event a fault occurs as recited by Applicant in independent claims 1 and 19. The Examiner acknowledges that Inaba does not teach or suggest the use of wire bonds and attempts to combine Inaba with Sugiyama to show the use of wire bonds in an inverter. However, the combination of Inaba and Sugiyama still does not teach or suggest the use of wire bonds sized to disconnect an inverter in the event of a fault. Sugiyama discusses the use of switches, not wire bonds as recited in independent claims 1 and 19, to remove a defective inverter and transfer operation to a standby inverter. The Examiner improperly attempts to equate the switches in Sugiyama with Applicant's recited wire bonds. The recited wire bonds in claims 1 and 19 do not operate like a switch, i.e., having open and closed positions, but in fact, provide an electrical break or disconnect, i.e., an open circuit, similar to a fuse that operates to disconnect the inverter from the DC link. In addition, Sugiyama uses a physical device to switch between inverters (*see Japanese Publication, Figure 3*), while the present invention as recited in claims 1 and 19 has no such physical device for switching, but, as discussed above, has a wire bond in each inverter to disconnect the inverter in the event of a fault.

In the Response to Arguments section in the outstanding Office Action discussing wire bonds, the Examiner states

Examiner believes, based on the claims as presented, that Sugiyama teaches the invention of wire bonds sized to disconnect the inverter from the DC link stage in the event a fault occurs in one of the inverter and the corresponding motor. By definition wire bonds have meanings that do not relate to the current invention. In the computer industry wire bonds means use of long wires that are soldered to the bare die on one end and to metal leads of the chip package on the other. Before the advent of flip chips and solder ball techniques, wire bonding was the traditional interconnection method to and from the chip. Further, wire bonds or wire bonding could mean connecting a electrical system together therefore, the term is broad. The Applicant on page 13 states that the wire bonds are an electrical break or disconnect which is similar to a fuse. Examiner does not see the relationship or similar meaning between a wire bond and a fuse. Sugiyama discloses a system that if a malfunction occurs in any of those inverters when the inverters are operated in parallel, the selecting (electrical) breakage switch (2) of the defective inverter is opened to disconnect the defective inverter. It should be noted that Kumar, described above, discloses a fuse.

Applicant disagrees with the Examiner's interpretation of Sugiyama as providing wire bonds and responds to the Examiner's arguments as follows. In addition, Applicant notes that the Examiner has stated that he "does not see a relationship between a wire bond and a fuse." First, Applicant has described wire bonds as being "a small diameter wire used to provide an electrical connection between terminals and/or silicon chips in the VSD 104, such as for providing a connection in parallel between the power device silicon chips such as the IGBTs and diodes in the inverter 206. The wire bonds inadvertently act similar to high-speed fuses and operate to disconnect the inverter 206 from the DC link 204 in the event a failure occurs in the inverter 206 or the motor 106." *See* Applicant's Specification, paragraph [0024]. Next, as described in the Specification, the wire bond is a small diameter wire providing an electrical connection. Thus, the only way the wire bond could act to disconnect an inverter is if the wire bond melts and breaks the circuit in response to a current through the wire bond exceeding a specified level, similar to how a fuse operates, as a result of a defective inverter or motor. Therefore, for the reasons given above, independent claims 1 and 19 are believed to be distinguishable from Inaba and/or Sugiyama and therefore are not anticipated nor rendered obvious by Inaba and/or Sugiyama.

Dependent claims 2-5, 11, 20-23, 27-29 and 30 are believed to be allowable as depending from what are believed to be allowable independent claims 1 and 19 for the reasons given above. In addition, claims 2-5, 11, 20-23, 27-29 and 30 recite further limitations that distinguish over the applied art. Some examples are provided below.

Claims 2 and 20 recite that the control system controls the converter. Inaba utilizes an uncontrolled diode rectifier for the converter and as such cannot teach or suggest a control system to control the converter stage as recited by Applicant in claims 2 and 20. The Examiner is requested to specifically identify the passage(s) in Inaba that shows controlling the converter with a control system. Similarly, Sugiyama does not teach or suggest this feature and appears to only have been applied to show the use of a switching arrangement with an inverter.

Claims 5 and 23 recite that the control system individually controls each inverter and the control system provides a different set of control instructions to each inverter. As discussed above, Inaba provides the same control signal to each driving circuit and as such cannot teach or suggest a control system that individually controls each inverter and provides a different set of control instructions to each inverter as recited by Applicant in claims 5 and 23. The Examiner is requested to specifically identify the passage(s) in Inaba that shows a control system individually controlling each inverter and providing a set of control instructions to each inverter. Similarly, Sugiyama does not teach or suggest this feature and appears to only have been applied to show the use of a switching arrangement with an inverter.

In conclusion, it is respectfully submitted that claims 1-5, 11, 19-23, 27-29 and 30 are not anticipated nor rendered obvious by Inaba and/or Sugiyama and are therefore allowable.

#### **B. Rejection of claims 6 and 24**

The Examiner rejected claims 6 and 24 under 35 U.S.C. § 103(a) as being unpatentable over Inaba in view of Sugiyama and further in view of Tokizaki et al. (U.S. Patent No. 5,528,114), hereafter referred to as "Tokizaki."

Applicants respectfully traverse the rejection of claims 6 and 24 under 35 U.S.C. § 103(a).

Inaba is directed to a mold clamping apparatus for use in an injection molding machine having a plurality of servomotors for synchronously drivingly rotating a ball screw as a spindle as discussed in greater detail above.

Sugiyama is directed to an inverter configuration that can disconnect a defective inverter from the circuit and replace it with another inverter as discussed in greater detail above.

Tokizaki, as understood, is directed to an apparatus for driving two separate motors from two separate inverters fed from a common AC source. The DC links of the two inverters are not electrically connected together. In addition, a single microprocessor is used with a limited number of output ports. The microprocessor uses six microprocessor ports for control of one inverter and three microprocessor ports, with the aid of external components (see Fig. 6), for control of the second inverter. Use of only three microprocessor ports for control of the second inverter provides for the control of other system level components.

Applicant submits that dependent claims 6 and 24 are distinguishable from Inaba and Sugiyama and Tokizaki for at least the following reasons. To begin, dependent claims 6 and 24 are believed to be distinguishable from Inaba and Sugiyama and Tokizaki as depending from what are believed to be allowable independent claims 1 and 19 as discussed above. Furthermore, there is nothing in Tokizaki that teaches or suggests any of the limitations in independent claims 1 and 19 not taught or suggested by Inaba and Sugiyama.

Applicant respectfully submits that the Examiner has improperly combined Inaba and Sugiyama and Tokizaki. The Examiner has provided no teaching or suggestion in Inaba and Sugiyama that would indicate the desirability of incorporating into Inaba and Sugiyama the circuitry of Tokizaki, nor has the Examiner cited any passage in Tokizaki that would indicate that the circuitry can be used with the driving circuits of Inaba and Sugiyama. The Examiner makes a statement that it would be advantageous to provide means to drive a plurality of motors and other electrical apparatus with plural sets of outputs based on a PWM system provided by the use of a signal microprocessor or similar controller. However, the Examiner provides no support for this conclusion in any of Inaba, Sugiyama or Tokizaki. Thus, Applicant respectfully submits that the Examiner has reached his conclusion based on the teachings in Applicant's specification, which is impermissible hindsight reasoning by the Examiner.

Furthermore, “[t]he mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art suggests the desirability of the combination.” *See MPEP, Section 2143.01.*

In addition, Applicant notes that the proposed combination of Inaba, Sugiyama or Tokizaki would render Inaba unsatisfactory for its intended purpose and would change the principle of operation of Inaba. As discussed above, the system in Inaba requires the same control signals to be provided to the inverters in order to have proper synchronization of the motors. Any attempt to provide different control signals to the inverter of Inaba would defeat the purpose of the invention in Inaba.

"If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959)." *See MPEP, Section 2143.01.* In addition, "[i]f the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984)." *See MPEP, Section 2143.01.*

Therefore, in view of the above, dependent claims 6 and 24 are believed to be distinguishable from Inaba and Sugiyama and Tokizaki and therefore are not anticipated nor rendered obvious by Inaba and Sugiyama and Tokizaki. In conclusion, it is respectfully submitted that claims 6 and 24 are not anticipated nor rendered obvious by Inaba and Sugiyama and Tokizaki and are therefore allowable.

#### **C. Rejection of claims 7, 8 and 25**

The Examiner rejected claims 7, 8 and 25 under 35 U.S.C. § 103(a) as being unpatentable over Inaba in view of Sugiyama and further in view of Kobayashi et al. (G.B. Publication No. 2 264 204), hereafter referred to as "Kobayashi." Applicant notes that Kobayashi has not been listed on a Notice of References Cited provided by the Examiner and requests that the Examiner list Kobayashi on a Notice of References Cited form to indicate the Examiner's consideration of the reference.

Applicants respectfully traverse the rejection of claims 7, 8 and 25 under 35 U.S.C. § 103(a).

Inaba is directed to a mold clamping apparatus for use in an injection molding machine having a plurality of servomotors for synchronously drivingly rotating a ball screw as a spindle as discussed in greater detail above.

Sugiyama is directed to an inverter configuration that can disconnect a defective inverter from the circuit and replace it with another inverter as discussed in greater detail above.

Kobayashi, as understood, is directed to a DC welding apparatus having parallel inverters. Kobayashi discloses the use of an uncontrolled diode rectifier for the converter, e.g., rectifying diode stacks 62a through 62d. *See e.g.*, Kobayashi, Figure 7 and page 16, second paragraph.

Applicant submits that dependent claims 7, 8 and 25 are distinguishable from Inaba and Sugiyama and Kobayashi for at least the following reasons. To begin, dependent claims 7, 8 and 25 are believed to be distinguishable from Inaba and Sugiyama and Kobayashi as depending from what are believed to be allowable independent claims 1 and 19 as discussed above. Furthermore, there is nothing in Kobayashi that teaches or suggests any of the limitations in independent claims 1 and 19 not taught or suggested by Inaba and Sugiyama.

In addition, several of the features recited by Applicant in claims 7, 8 and 25 are not taught or suggested by Inaba and Sugiyama and Kobayashi. First, Inaba and Sugiyama and Kobayashi do not teach or suggest the converter stage is configured in a rectifier arrangement having electronic switches that are switchable only to an on position. The converter stage is configured in a converter arrangement having electronic switches that are switchable to an on position and an off position or the converter section comprises at least one silicon controlled rectifier as recited by Applicant in claims 7, 8 and 25. As discussed above, Inaba and Kobayashi discuss the use of non-controlled diodes that naturally conduct and are not switched in their respective converters.

Applicant respectfully submits that the Examiner has improperly combined Inaba and Sugiyama and Kobayashi. The Examiner has provided no teaching or suggestion in Inaba and Sugiyama that would indicate the desirability of incorporating into Inaba and Sugiyama the

circuitry of Kobayashi, nor has the Examiner cited any passage in Kobayashi that would indicate that the circuitry can be used with the driving circuits of Inaba and Sugiyama. The Examiner makes a statement that it would be advantageous to provide a plurality of general purpose motors, each coupled to a load apparatus, so as to drive the load more efficiently by means of a plurality of motors. However, the Examiner provides no support for this conclusion in any of Inaba, Sugiyama or Kobayashi. Thus, Applicant respectfully submits that the Examiner has reached his conclusion based on the teachings in Applicant's specification, which is impermissible hindsight reasoning by the Examiner.

Therefore, in view of the above, dependent claims 7, 8 and 25 are believed to be distinguishable from Inaba and Sugiyama and Kobayashi and therefore are not anticipated nor rendered obvious by Inaba and Sugiyama and Kobayashi. In conclusion, it is respectfully submitted that claims 7, 8 and 25 are not anticipated nor rendered obvious by Inaba and Sugiyama and Kobayashi and are therefore allowable.

**D. Rejection of claim 9**

The Examiner rejected claim 9 under 35 U.S.C. § 103(a) as being unpatentable over Inaba in view of Sugiyama and Kobayashi and further in view of Sood (U.S. Patent No. 5,235,504), hereafter referred to as "Sood."

Applicants respectfully traverse the rejection of claim 9 under 35 U.S.C. § 103(a).

Inaba is directed to a mold clamping apparatus for use in an injection molding machine having a plurality of servomotors for synchronously drivingly rotating a ball screw as a spindle as discussed in greater detail above.

Sugiyama is directed to an inverter configuration that can disconnect a defective inverter from the circuit and replace it with another inverter as discussed in greater detail above.

Kobayashi is directed to a DC welding apparatus having parallel inverters as discussed in greater detail above.

Sood, as understood, is directed to a single phase buck/boost converter that operates in the buck mode for one portion of the input line voltage cycle and in the boost configuration for the remaining portion of the input line voltage cycle in order to provide a DC output voltage

from the single phase source. The buck and boost sections operate on a time-sharing basis to provide high power factor and nearly full conduction.

Applicant submits that dependent claim 9 is distinguishable from Inaba, Sugiyama, Kobayashi and Sood for at least the following reasons. To begin, dependent claim 9 is believed to be distinguishable from Inaba, Sugiyama, Kobayashi and Sood as depending from what is believed to be an allowable independent claim 1 as discussed above. Furthermore, there is nothing in Sood that teaches or suggests any of the limitations in independent claim 1 not taught or suggested by Inaba, Sugiyama and Kobayashi.

Therefore, in view of the above, dependent claim 9 is believed to be distinguishable from Inaba, Sugiyama, Kobayashi and Sood and therefore are not anticipated nor rendered obvious by Inaba, Sugiyama, Kobayashi and Sood. In addition, claim 9 recites further limitations that distinguish over the applied art. In conclusion, it is respectfully submitted that claim 9 is not anticipated nor rendered obvious by Inaba, Sugiyama, Kobayashi and Sood and is therefore allowable.

#### **E. Rejection of claims 13-18**

The Examiner rejected claims 13-18 under 35 U.S.C. § 103(a) as being unpatentable over Inaba in view of Beaverson et al. (U.S. Patent No. 5,894,736), hereafter referred to as "Beaverson," and Sugiyama.

Specifically, the Examiner stated that

Regarding Claims 13 and 14, Inaba discloses a converter stage (Figure 3 item 10) to convert an AC voltage to a DC voltage, the converter stage being configured to be electrically connectable to an AC power source (Figure 3 item E), a DC link stage (Figure 3 item C) to filter and store energy from the converter stage, the DC link stage being electrically connected to the converter stage; an inverter stage (Figure 3 Items 11 and 11') comprising a plurality of inverters electrically connected in parallel to the DC link stage, each inverter of the plurality of inverters being configured to convert a DC voltage to an AC voltage to power a corresponding load, and the control circuit (Figure 3 item 12) controls each inverter of the plurality of inverters being configured to operate substantially independently of other inverters of the plurality of inverters.

Refer to column 3 lines 1-68 and column 4 lines 1-34

However Inaba does not disclose a refrigerant circuit, the refrigerant circuit comprising a first compressor driven by a motor, a condenser arrangement and a evaporator arrangement connected in a closed refrigerant loop.

Beaverson discloses a method and apparatus for detecting surge in centrifugal compressors which includes a refrigerant circuit (Figure 1) comprising a compressor (Figure 1 item 12) driven by a motor (Figure 1 item 20), a condenser arrangement (Figure 1 item 14) and a evaporator arrangement (Figure 1 item 18) connected in a closed refrigerant loop.

Applicant should refer to M.P.E.P. 2144.04[R-1] Section VI under duplication of parts where in *In re Harza*, 274 F.2d 669, 124 USPQ 379 (CCPA 1966) (Claims at issue were directed to a water-tight masonry structure wherein a water seal of flexible material fills the joints which form between adjacent piers of concrete. The claimed water seal has a "web" which has "tusks" in the joint, and a plurality of "tubs" >>projecting outwardly from each side of the web into one of the adjacent concrete slabs <The prior art disclosed a flexible water stop for preventing passage of water between masses of concrete in the shape of a plus sign (+). Although the reference did not disclose a plurality of ribs, the court held that mere duplication of parts has no patentable significance unless a new and unexpected result is produced.). In this case, the refrigerant circuit is duplicated to meet the needs of the inventor and invention. The duplication of parts has no patentable significance unless a new and unexpected result is produced in the case.

However, neither Inaba nor Beaverson discloses wire bonds sized to disconnect the inverter from the DC link stage in the event a fault occurs in one of the inverter and the corresponding motor.

It would have been obvious to one of ordinary skill in the art at the time of invention to use Inaba's invention and Beaverson's invention with Sugiyama's a parallel redundancy synchronous operation type inverter. The advantage of combining the two would improve the reliability of an inverter by disconnecting only the inverter when a defect occurs in any of the inverters and switching to a standby inverter.

Applicants respectfully traverse the rejection of claims 13-18 under 35 U.S.C. § 103(a).

Inaba is directed to a mold clamping apparatus for use in an injection molding machine having a plurality of servomotors for synchronously drivingly rotating a ball screw as a spindle as discussed in greater detail above.

Sugiyama is directed to an inverter configuration that can disconnect a defective inverter from the circuit and replace it with another inverter as discussed in greater detail above.

Beaverson, as understood, is directed to a method for detecting surge in centrifugal compressor applications.

In contrast, independent claim 13 recites a chiller system comprising: a first refrigerant circuit, the first refrigerant circuit comprising a first compressor driven by a first motor, a first condenser arrangement and a first evaporator arrangement connected in a closed refrigerant loop; a second refrigerant circuit, the second refrigerant circuit comprising a second compressor driven by a second motor, a second condenser arrangement and a second evaporator arrangement connected in a closed refrigerant loop; and a variable speed drive comprising: a converter stage to convert an AC voltage to a DC voltage, the converter stage being configured to be electrically connectable to an AC power source; a DC link stage to filter and store energy from the converter stage, the DC link stage being electrically connected to the converter stage; and an inverter stage comprising a first inverter and a second inverter each electrically connected in parallel to the DC link stage, the first inverter being configured to convert a DC voltage to an AC voltage to power the first motor, the second inverter being configured to convert a DC voltage to an AC voltage to power the second motor, the first inverter and the second inverter each being configured and disposed to receive an individual control signal from a control panel that is separate and independent from control signals provided to the other inverter, and the first inverter and the second inverter each being controlled and operated substantially independently of each other by the individual control signals received from the control panel; and wherein the first inverter and the second inverter each comprise wire bonds sized to disconnect the inverter from the DC link stage in the event a fault occurs in one of the inverter and the corresponding motor powered by the inverter.

Several of the features recited by Applicant in independent claim 13 are not taught or suggested by Inaba and Sugiyama and Beaverson. First, Inaba does not teach or suggest a variable speed drive with the first inverter and the second inverter each being configured and disposed to receive an individual control signal from a control panel that is separate and independent from control signals provided to the other inverter, and the first inverter and the second inverter each being controlled and operated substantially independently of each other as recited by Applicant in independent claim 13. Next, Inaba and Sugiyama do not teach or suggest wire bonds to disconnect the inverter from the DC link stage as recited by Applicant in independent claim 13. The Examiner is referred to the above detailed discussion of Inaba and

Sugiyama with regard to independent claims 1 and 19 as to why Inaba and Sugiyama do not teach or suggest these limitations. Furthermore, there is nothing in Beaverson that teaches or suggests a variable speed drive with the first inverter and the second inverter each being configured and disposed to receive an individual control signal from a control panel that is separate and independent from control signals provided to the other inverter, and the first inverter and the second inverter each being controlled and operated substantially independently of each other as recited by Applicant in independent claim 13.

Next, Applicant respectfully submits that the Examiner has improperly combined Inaba and Sugiyama and Beaverson and the Examiner's logic regarding the duplication of parts. To begin, the Examiner asserts that based on the MPEP, Section 2144.04[VI], the Applicant's recitation of a second refrigerant circuit (comprising a second compressor driven by a second motor, a second condenser arrangement and a second evaporator arrangement connected in a closed refrigerant loop) "is duplicated to meet the needs of the inventor and invention." The Examiner goes on to state that the "duplication of parts has no patentable significance unless a new and unexpected result is produced in the case." In this case, the Examiner's reliance on Section 2144.04[VI] appears to be misplaced. MPEP Section 2144.04 explicitly states that "if the facts in a prior legal decision are sufficiently similar to those in an application under examination, the examiner may use the rationale used by the court." In the outstanding Office Action, the case cited by the Examiner (*In re Harza*) shows that a recited limitation of a plurality of ribs can be obvious in view of a reference that presumably has only one rib in the shape of a plus sign. However, in claim 13, Applicant has not recited a plurality of anything nor has Applicant "duplicated a part," but in fact Applicant has recited two discrete items, i.e., refrigerant circuits each having distinct components, thus the reasoning of the case cited by the Examiner is not applicable to independent claim 13 and cannot be used to support the Examiner's position. This is further supported by the fact that the first refrigerant circuit and the second refrigerant circuit do not require the same equipment. For example, the first compressor and the second compressor recited in independent claim 13 can have different capacities and can even be different types of compressors.

Next, even assuming for argument purpose only that the Examiner's reasoning regarding the duplication of the refrigerant circuit is correct, the Examiner has still improperly combined Inaba and Sugiyama and Beaverson. The Examiner has provided no teaching or suggestion in Inaba and Sugiyama that would indicate the desirability of incorporating into Inaba and Sugiyama the refrigerant circuit of Beaverson, nor has the Examiner cited any passage in Beaverson that would indicate that the refrigerant circuit can be used with the driving circuit of Inaba and Sugiyama. The Examiner makes a statement that it would be advantageous to combine the references to provide a system with an improved means of surge detection in centrifugal compressors driven by an electric motor. However, this motivation is inappropriate because independent claim 13 is not limited to centrifugal compressors and in fact may incorporate one of several different types of compressors. Thus, since Applicant's recited limitation may not be directed to a centrifugal compressor, there would be no motivation to combine to address a problem that would not be present, i.e., a surge condition. One skilled in the art would not implement a surge detection process for a system that would not experience a surge condition.

Furthermore, making additional assumptions for argument purposes only that Inaba and Sugiyama and Beaverson can be combined, the combination proposed by the Examiner still does not read on all of Applicant's recited limitations in independent claim 13. As discussed above, the system in Inaba and Sugiyama replaces a larger motor with two smaller motors that have their outputs connected together to drive a common device, e.g., the ball screw. Thus, there is nothing in Inaba, Sugiyama or Beaverson that teaches inverter sections powering separate motors connected to separate compressors in separate refrigerant circuits. At best, it appears that Inaba and Sugiyama could teach the replacement of the single motor in Beaverson with two motors powered by the same drive. Applicant submits that this proposed combination would appear to require a second variable speed drive for the second refrigerant circuit. Applicant submits that Inaba and Sugiyama is incapable of powering two motors each connected to a separate compressor as recited by Applicant in independent claim 13.

Applicant respectfully submits that the Examiner has reached his conclusion based on the teachings in Applicant's specification, which is impermissible hindsight reasoning by the Examiner.

In making the assessment of differences, section 103 specifically requires consideration of the claimed invention "as a whole." Inventions typically are new combinations of existing principles or features. *Envtl. Designs, Ltd. v. Union Oil Co.*, 713 F.2d 693, 698 [218 USPQ 865] (Fed. Cir. 1983) (noting that "virtually all [inventions] are combinations of old elements.").") The "as a whole" instruction in title 35 prevents evaluation of the invention part by part. Without this important requirement, an obviousness assessment might break an invention into its component parts (A + B + C), then find a prior art reference containing A, another containing B, and another containing C, and on that basis alone declare the invention obvious. This form of hindsight reasoning, using the invention as a roadmap to find its prior art components, would discount the value of combining various existing features or principles in a new way to achieve a new result – often the very definition of invention.

Section 103 precludes this hindsight discounting of the value of new combinations by requiring assessment of the invention as a whole. This court has provided further assurance of an "as a whole" assessment of the invention under §103 by requiring a showing that an artisan of ordinary skill in the art at the time of invention, confronted by the same problems as the inventor and with no knowledge of the claimed invention, would select the various elements from the prior art and combine them in the claimed manner. In other words, the examiner or court must show some suggestion or motivation, before the invention itself, to make the new combination. See *In re Rouffet*, 149 F.3d 1350, 1355-56 [47 USPQ2d 1453] (Fed. Cir. 1998).

*Ruiz v. A.B. Chance Co.*, 69 USPQ2d 1686, 1690 (Fed. Cir. 2004).

Therefore, for the reasons given above, independent claim 13 is believed to be distinguishable from Inaba and Sugiyama and Beaverson and therefore is not anticipated nor rendered obvious by Inaba and Sugiyama and Beaverson.

Applicant submits that dependent claims 14-18 are distinguishable from Inaba and Sugiyama and Beaverson for at least the following reasons. To begin, dependent claims 14-18 are believed to be distinguishable from Inaba and Sugiyama and Beaverson as depending from what is believed to be an allowable independent claim 13 as discussed above. In addition, claims 14-18 recite further limitations that distinguish over the applied art.

In conclusion, it is respectfully submitted that claims 13-18 are not anticipated nor rendered obvious by Inaba and Sugiyama and Beaverson and are therefore allowable.

**F. Rejection of claims 31 and 32**

The Examiner rejected claims 31 and 32 under 35 U.S.C. § 103(a) as being unpatentable over Inaba in view of Sugiyama and further in view of Rose (U.S. Patent No. 2,442,021), hereafter referred to as "Rose."

Applicants respectfully traverse the rejection of claims 31 and 32 under 35 U.S.C. § 103(a).

Inaba is directed to a mold clamping apparatus for use in an injection molding machine having a plurality of servomotors for synchronously drivingly rotating a ball screw as a spindle as discussed in greater detail above.

Sugiyama is directed to an inverter configuration that can disconnect a defective inverter from the circuit and replace it with another inverter as discussed in greater detail above.

Rose, as understood, is directed to a sectionalized variable speed drive. Rose discloses the use of multiple DC motors driving a common load, connected in an alternate series configuration and driven from parallel connected rectifiers composed of a circuit breaker, an auto-transformer to maintain maximum power factor at any speed, a double three phase converter transformer and make-alive type valves. Rose requires the use of a double three phase converter transformer which is interposed between the six valves and the autotransformer.

Applicant submits that dependent claims 31 and 32 are distinguishable from Inaba and Sugiyama and Rose for at least the following reasons. To begin, dependent claims 31 and 32 are believed to be distinguishable from Inaba and Sugiyama and Rose as depending from what is believed to be an allowable independent claim 19 as discussed above. Furthermore, there is nothing in Rose that teaches or suggests any of the limitations in independent claim 19 not taught or suggested by Inaba and Sugiyama.

Therefore, in view of the above, dependent claims 31 and 32 are believed to be distinguishable from Inaba and Sugiyama and Rose and therefore are not anticipated nor rendered obvious by Inaba and Sugiyama and Rose. In addition, claims 31 and 32 recite further limitations that distinguish over the applied art. In conclusion, it is respectfully submitted that

claims 31 and 32 are not anticipated nor rendered obvious by Inaba and Sugiyama and Rose and are therefore allowable.

**G. Rejection of claims 33-34**

The Examiner rejected claims 33-34 under 35 U.S.C. § 103(a) as being unpatentable over Inaba in view of Sugiyama and further in view of Kumar (U.S. Patent No. 5,896,021), hereafter referred to as "Kumar."

Applicants respectfully traverse the rejection of claims 33-34 under 35 U.S.C. § 103(a).

Inaba is directed to a mold clamping apparatus for use in an injection molding machine having a plurality of servomotors for synchronously drivingly rotating a ball screw as a spindle as discussed in greater detail above.

Sugiyama is directed to an inverter configuration that can disconnect a defective inverter from the circuit and replace it with another inverter as discussed in greater detail above.

Kumar, as understood, is directed to the removal of moisture from induction motors. Kumar discloses the use of DC current or single phase AC current to provide a source of heat within a motor to prevent leakage currents to ground as a result of freezing and thawing conditions. Kumar includes the use of a single-phase transformer (note this is not an autotransformer, see col. 2, line 10) connected to a single-phase circuit breaker through a set of inductors to a converter.

Applicant submits that dependent claims 33-34 are distinguishable from Inaba and Sugiyama and Kumar for at least the following reasons. To begin, dependent claims 33-34 are believed to be distinguishable from Inaba and Sugiyama and Kumar as depending from what is believed to be an allowable independent claim 19 as discussed above. Furthermore, there is nothing in Kumar that teaches or suggests any of the limitations in independent claim 19 not taught or suggested by Inaba and Sugiyama.

Therefore, in view of the above, dependent claims 33-34 are believed to be distinguishable from Inaba and Sugiyama and Kumar and therefore are not anticipated nor rendered obvious by Inaba and Sugiyama and Kumar. In addition, claims 33-34 recite further limitations that distinguish over the applied art. In conclusion, it is respectfully submitted that

claims 33-34 are not anticipated nor rendered obvious by Inaba and Sugiyama and Kumar and are therefore allowable.

**Allowable Subject Matter**

The Examiner objected to claims 12 and 18 as being dependent upon a rejected base claim, but indicated that the claims would be allowable, if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicant appreciates the Examiner's indication of allowable subject matter, but believes that all of the claims are allowable for the reasons given above.

**CONCLUSION**

In view of the above, Applicant respectfully requests reconsideration of the Application and withdrawal of the outstanding objections and rejections. As a result of the amendments and remarks presented herein, Applicant respectfully submits that claims 1-9, 11-25 and 27-34 are not anticipated by nor rendered obvious by Inaba, Sugiyama, Tokizaki, Kobayashi, Sood, Beaverson, Rose, Kumar or their combination(s) and thus, are in condition for allowance. As the claims are not anticipated by nor rendered obvious in view of the applied art, Applicant requests allowance of claims 1-9, 11-25 and 27-34 in a timely manner. If the Examiner believes that prosecution of this Application could be expedited by a telephone conference, the Examiner is encouraged to contact the Applicant.

The Commissioner is hereby authorized to charge any additional fees and credit any overpayments to Deposit Account No. 50-1059.

Respectfully submitted,  
**McNEES, WALLACE & NURICK**

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By

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